

venes between them. But I did not suppose it would be so inconveniently that way, as in fact. However, it will be right at the end of the year, next Oct., and I do not suppose it likely that I will be able to pay the \$10 before; but then it *shall* come with interest. The most unpleasant part of the matter is that I am not able to do anything for my sisters, but I *shall* do more after the time mentioned. I am in a situation to learn a good deal that will be profitable to me hereafter, in a *dollar and cents* view, too, and therefore I take up with a good deal of inconvenience and some *chagrin*, which is better by the way, than with a tinsel character to be an adventurer *upon* the world; for it *ends* well.

We have been making Daguerreotype Instruments for taking portraits. I am now making myself one. I may have such word from New York as to enable me to take it east and finally sell it in N. Y. or otherwheres. I suppose we make better instruments of this kind than are made *otherwheres*. This of mine will be worth \$15 to \$25. I have thought some of going abroad and taking portraits myself, but that is somewhat slow. I wish much to see you and more especially to hear from you by *letter* that you enjoy *health*, etc.

Your affectionate Grandson,

R. B. TOLLES.

Father expects to make sale of an improvement on the Rail Road Cos. for the prevention of accidents from the "Snake heads" as they call them (a loosend rail bent up at the end, a frequent thing). Mr. Spencer, my employer, has taken the negotiations into his hands, and it is quite probable that it may result favorably. R. B. T.

A NEW MEDIUM FOR DARK-FIELD OBSERVATION—"THE LEITZ CONCENTRIC REFLECTING CONDENSER."

This improved Reflecting Condenser, the invention of Dr. Felix Jentsch,* of the scientific department of E. Leitz, Wetzlar, is adapted for observation under dark-ground illumination, and more especially for bringing into view living and unstained bacteria.

Every Microscopist familiar with the darkground illuminating apparatus has certainly realized the importance of such an instrument, and it undoubtedly will interest him to learn that E. Leitz has now introduced a new type of Darkfield Condenser, the so-called "Concentric Reflecting Condenser."

The object of this method is to establish an extremely vivid contrast between the intensely illuminated bacteria and the dark back-ground. To obtain such a dark back-ground it is essential

*Physikalische Zeitschrift, Vol. 11, pp. 993-1000, 1910, and Verhandlungen der deutschen Physikalischen Gesellschaft, Vol. 12, pp. 975-991, 1910. Paper read on the 22 Sept., 1910, before the 82nd German Congress of Science and Medicine at Königsberg.

that none of the rays which go to illuminate the object should pass directly into the objective, and to secure an intense illumination of the object it is necessary to employ a very powerful source of light and to form a perfectly defined image of the radiant within the preparation itself.

Both requirements are satisfied by the presence of two reflecting surfaces, one convex, the other concave, both being arranged as indicated in Fig. 1. Since the rays are brought to a focus by reflection only, whilst refraction does not enter into the process, there is no chromatic dispersion. The spherical aberration, on the other hand, is reduced to an *insignificant amount* and does not within the entire zone which enters into consideration exceed 0.7 per mile or 0.0007 of the focal length of the system, i. e., in the condenser as

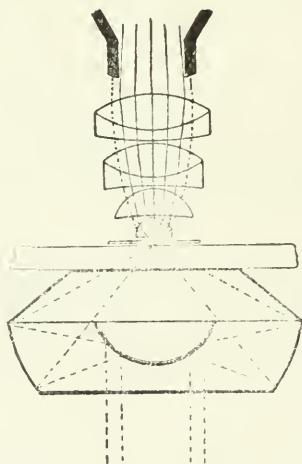


Fig. 1.

actually made the whole of the rays which enter the condenser in a direction parallel to the axis are brought to a focus accurately within 2.3 micron. *This entitles the Concentric Condenser to be looked upon as the most perfectly corrected optical combination which is in existence at the present time*, and it represents the closest approach to an ideally perfect aplanatic system which has yet been produced.

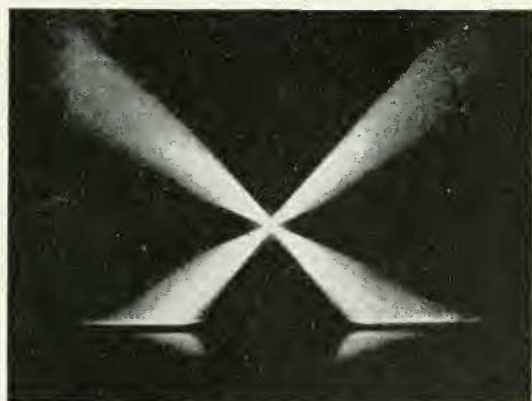


Fig. 2.